

## CLAIMS

1. A three-dimensional periodic structure comprising a plurality of three-dimensional periodic structure areas each containing a first substance and a second substance with  
5 different dielectric constants, which are periodically distributed in a three-dimensional space, wherein the plurality of three-dimensional periodic structure areas have different ratios between the dielectric constants of the first and second substances.

10 2. A three-dimensional periodic structure comprising a plurality of three-dimensional periodic structure areas each containing first and second substances with different dielectric constants, which are periodically distributed in a three-dimensional space, wherein the plurality of three-  
15 dimensional periodic structure areas have different average dielectric constants.

3. The three-dimensional periodic structure according to claim 1 or 2, wherein the first substance is a resin optically cured by activation, the resin constituting a  
20 crystal portion having voids distributed therein with three-dimensional periodicity, and the second substance is a resin containing ceramic particles dispersed therein, the voids being filled with the second substance.

4. The three-dimensional periodic structure according to  
25 claim 1 or 2, wherein the first substance is a resin

optically cured by activation and containing ceramic particles dispersed therein, the resin constituting a crystal portion having voids distributed with a three-dimensional period, and the second substance is a resin, the voids being filled with the second substance.

5        5. The three-dimensional periodic structure according to any one of claims 1 to 4, wherein the second substance is a thermosetting resin or a thermoplastic resin, and is thermally cured after being charged in the voids.

10       6. The three-dimensional periodic structure according to any one of claims 1 to 5, comprising a plurality of three-dimensional periodic structure units arranged so that the ratio between the dielectric constants is changed to increase or decrease in the arrangement direction.

15       7. The three-dimensional periodic structure according to any one of claims 1 to 6, wherein one period is 0.1 mm to 30 mm.

8. A method for producing a three-dimensional periodic structure comprising the steps of:

20       forming a three-dimensional periodic structure using a first substance by an optical molding process in which irradiation of a photocurable resin is repeated for every sectional pattern layer to be formed, and providing partitions for dividing the three-dimensional periodic structure into a plurality of areas;

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filling, by vacuum degassing, voids in the respective areas of the structure composed of the first substance with a plurality of second substances having different contents of ceramic particles dispersed in a resin; and

5       curing the second substances.